

## Gas Thyatron

## TETRODE TYPE

For Relay and Grid-Controlled-Rectifier Service

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC) . . . . .  $6.3 \pm 10\%$  volts

Current at 6.3 volts . . . . . 0.6 amp

Cathode:

Minimum heating time prior to  
tube conduction . . . . . 10 secDirect Interelectrode Capacitances (Approx.):<sup>a</sup>Grid No.1 to anode . . . . . 0.15  $\mu\text{mf}$ Grid No.1 to cathode and grid No.2 . . . . 2.2  $\mu\text{mf}$ 

Ionization Time (Approx.):

For dc anode volts = 100, grid-No.1  
volts (square-wave pulse) = 50, peak  
anode amperes during conduction = 1 . . . 0.5  $\mu\text{sec}$ 

Deionization Time (Approx.):

With dc anode volts = 125, grid-No.1  
volts = -250, grid-No.1 resistor (ohms)  
= 1000, dc anode amperes = 0.1 . . . . 50  $\mu\text{sec}$ With dc anode volts = 125, grid-No.1  
volts = -10, grid-No.1 resistor (ohms)  
= 1000, dc anode amperes = 0.1 . . . . 100  $\mu\text{sec}$ 

Maximum Critical Grid-No.1 Current for

dc anode supply volts (rms) = 460,  
average anode amperes = 0.1 . . . . . 0.5  $\mu\text{a}$ 

Anode Voltage Drop (Approx.) . . . . . 8 volts

Grid-No.1 Control Ratio (Approx.) for grid-

No.1 resistor (ohms) = 0, grid No.2  
connected to cathode at socket . . . . . 250

Grid-No.2 Control Ratio (Approx.) for

grid-No.1 resistor (ohms) = 0, grid-No.2  
resistor (ohms) = 0, grid No.1 connected  
to cathode at socket . . . . . 800

## Mechanical:

Operating Position . . . . . Any

Maximum Overall Length . . . . .  $3\text{--}1/16"$ Maximum Seated Length . . . . .  $2\text{--}1/2"$ Maximum Diameter . . . . .  $1\text{--}9/32"$ Dimensional Outline . . . . . See *General Section*

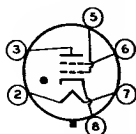
Bulb . . . . . T9

Base . . . . . Intermediate-Shell Octal 6-Pin, Arrangement 3,  
with External Barriers (JEDEC Group 1, B6-229)

# 2050-A

Basing Designation for BOTTOM VIEW. . . . . 6BS

Pin 2—Heater  
Pin 3—Anode  
Pin 5—Grid No.1



Pin 6—Grid No.2  
Pin 7—Heater  
Pin 8—Cathode

## RELAY AND GRID-CONTROLLED-RECTIFIER SERVICE

### Maximum and Minimum Ratings, Absolute-Maximum Values:

*For anode supply frequency of 60 cps*

#### PEAK ANODE VOLTAGE:

Forward. . . . .	180 max.	650 max.	volts
Inverse. . . . .	360 max.	1300 max.	volts

#### GRID-No.2 (SHIELD-GRID)

##### VOLTAGE:

Peak, before tube conduction . . . . .	-100 max.	-100 max.	volts
Average <sup>b</sup> , during tube conduction . . . . .	-10 max.	-10 max.	volts

#### GRID-No.1 (CONTROL-GRID)

##### VOLTAGE:

Peak, before tube conduction . . . . .	-250 max.	-250 max.	volts
Average <sup>b</sup> , during tube conduction . . . . .	-10 max.	-10 max.	volts

#### CATHODE CURRENT:

Peak . . . . .	1 max.	1 max.	amp
Average <sup>b</sup> . . . . .	0.2 max.	0.1 max.	amp
Fault, for duration of 0.1 second maximum . . . . .	10 max.	10 max.	amp

#### GRID-No.2 CURRENT:

Average <sup>b</sup> . . . . .	+0.01 max.	+0.01 max.	amp
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#### GRID-No.1 CURRENT:

Average <sup>b</sup> . . . . .	+0.01 max.	+0.01 max.	amp
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#### PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode . . .	100 max.	100 max.	volts
Heater positive with respect to cathode . . .	25 max.	25 max.	volts

AMBIENT-TEMPERATURE RANGE. .	-75 to +90	-75 to +90	°C
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### Typical Operation for Relay Service:

RMS Anode Voltage. . . . .	117	400	volts
Grid No.2. . . . .	Connected to cathode at socket		
RMS Grid-No.1 Bias Voltage <sup>c</sup> . . .	5	-	volts
DC Grid-No.1 Bias Voltage. . .	-	-6	volts
Peak Grid-No.1 Signal Voltage. . . . .	5	6	volts
Grid-No.1-Circuit Resistance . . . . .	1	1	megohm
Anode-Circuit Resistance <sup>d</sup> . . .	1200	2000	ohms



**Maximum Circuit Values:****Grid-No.1-Circuit Resistance:**

For average anode current below

0.1 ampere. . . . . 10 max. megohms

For average anode current above

0.1 ampere. . . . . 2 max. megohms

<sup>a</sup> Without external shield.<sup>b</sup> Averaged over any interval of 30 seconds maximum.<sup>c</sup> Approximately 180° out of phase with the anode voltage.<sup>d</sup> Sufficient resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings.**OPERATING CONSIDERATIONS**

The *heater* is designed to operate on either ac or dc at 6.3 volts. Regardless of the heater-voltage supply used, *the heater voltage must never be allowed to deviate from its rated range*. Heater operation outside of this voltage range will impair tube performance and may cause tube failure. Low heater voltage causes low cathode temperature with resultant cathode sputtering and consequent destruction of the cathode; high heater voltage causes high cathode temperature with resultant heating of the grid and consequent grid emission which produces unpredictable shifts in the critical grid-No.1 voltage for conduction.

The *cathode* should be allowed to reach normal operating temperature before anode current is drawn. *The delay period should not be less than 10 seconds after application of heater voltage*. Unless this recommendation is followed, the cathode will be damaged.

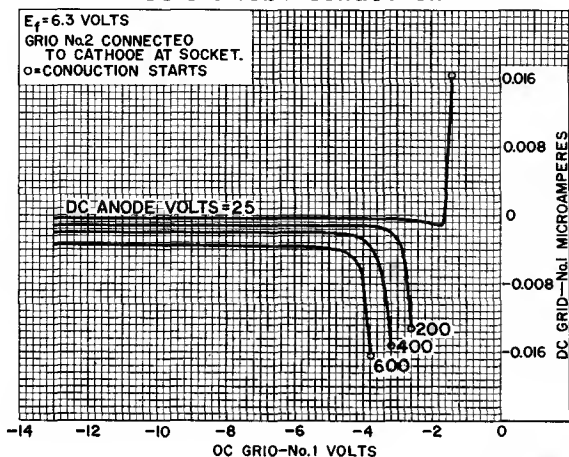
The *shield grid* (grid No.2) is normally connected to the cathode at socket. It may, however, be used as a control electrode because the control characteristic of grid No.1 may be shifted by varying the potential of grid No.2. As grid No.2 is made negative, the grid-No.1 characteristic is shifted in the positive direction. The use of grid No.2 as the control electrode (with grid No.1 connected to cathode at socket) has the advantage of increased sensitivity but consideration must be given to the higher pre-conduction current, higher capacitance to anode, and less stability of operation.

A *grid-No.1 resistor* having a value as high as 10 megohms to give circuit sensitivity can be used with the 2050-A because its control-grid current is very low. However, when a high value of grid resistor is used, care should be taken to keep the tube base and socket clean and dry in order to make the effect of leakage currents between the control-grid base pin and anode base pin very small.

*Sufficient anode-circuit resistance, including the tube load, must be used under any conditions of operation to prevent exceeding the current ratings of the tube.*

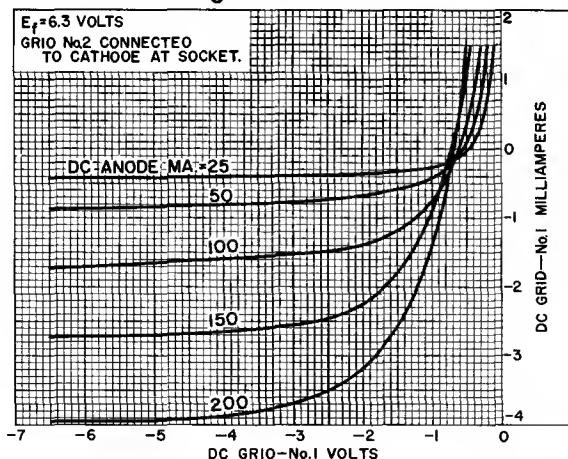


## AVERAGE GRID-No.1 CHARACTERISTICS Before Tube Conduction



92CS-6541R2

## During Tube Conduction



92CS-6275R2



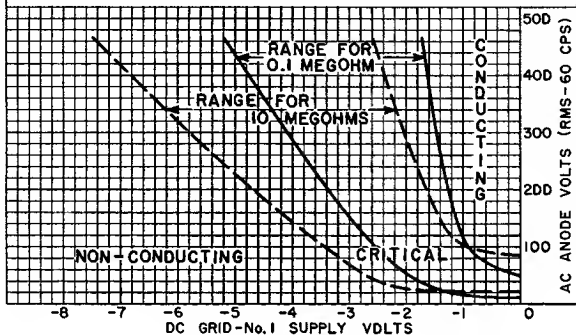
# OPERATIONAL RANGE OF CRITICAL GRID-No.1 VOLTAGE

$E_f = 6.3 \pm 10\%$  VOLTS

GRID No.2 CONNECTED TO CATHODE AT SOCKET.

AMBIENT-TEMPERATURE RANGE ( $^{\circ}\text{C}$ ) =  $-75$  TO  $+90$

RANGES SHOWN ARE FOR TWO VALUES OF GRID-No.1 RESISTOR AND TAKE INTO ACCOUNT INITIAL DIFFERENCES BETWEEN INDIVIDUAL TUBES AND SUBSEQUENT DIFFERENCES DURING TUBE LIFE.

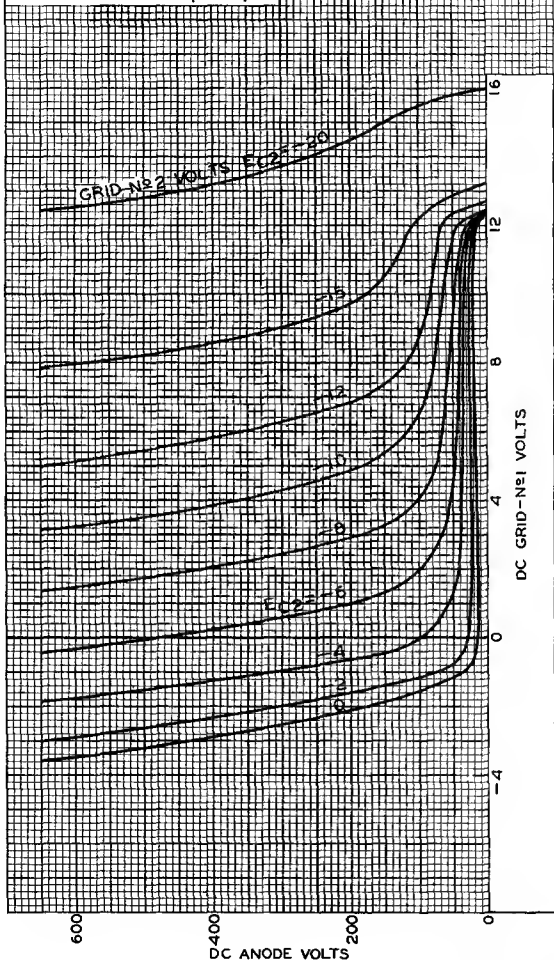


92CS-6540R3



## AVERAGE CONTROL CHARACTERISTICS

$E_f = 6.3$  VOLTS  
 GRID-Nº2 RESISTOR (OHMS) = 0  
 GRID-Nº1 RESISTOR (OHMS) = 0



92CM-6274R2

